

Remarks

The applicant respectfully requests reconsideration of the present U.S. Patent application as amended herein. Claims 1, 8, and 17 have been amended. Claims 22 and 23 are new. No claims have been canceled. Thus, claims 1-23 are pending.

Claim Rejections – 35 U.S.C. § 112

Claim 1 was rejected under 35 U.S.C. § 112 for lack of antecedent basis for the phrase “the instructions.” The phrase has been amended to recite “the non-device-specific instructions.” Therefore, the applicant submits that the rejection has been overcome and should be withdrawn.

Claim Rejections – 35 U.S.C. § 103(a)

Claims 1-3 and 6-7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Cohen et al. (U.S. Patent 6,434,618) in view of Ramaswamy et al. (U.S. Patent 6,424,621). However, the applicant submits that claims 1-3 and 6-7 are patentable over Cohen in view of Ramaswamy because the references fail to teach or suggest every element of the claims.

Claim 1 recites:

a forwarding element to perform data forwarding in a computer network, the forwarding element configurable with a device-specific instruction set;
a control element to perform network signaling and control in the computer network, the control element outputting non-device-specific instructions to configure the forwarding element;
an interconnecting element operatively connecting the forwarding element to the control element; and

a forwarding element plugin integrated with the control element to conceal from the control element a configuration interface of the forwarding element by receiving the non-device-specific instructions from the control element, translating the non-device-specific instructions into the device-specific instruction set of the forwarding element, and transmitting the device-specific instructions to the forwarding element, wherein the forwarding element utilizes the device-specific instructions to configure the forwarding element for performing data forwarding in the computer network.

The references do not teach the claimed forwarding element plugin

To fully capture the nature and importance of the forwarding element plugin, some brief introductory remarks are in order. In some cases it can be beneficial to separate the functionality of a network router or switch, for example, into distinct control and forwarding elements made by separate manufacturers. The forwarding element plugin is a module that receives non-device-specific instructions from the control element for configuring the forwarding element. The forwarding element plugin translates the standardized instructions into specialized, or device-specific, instructions for configuring the forwarding element. Due to the fact that forwarding elements are highly specialized pieces of hardware, often these device-specific instructions are indicative of the design and hardware implementation of the forwarding element and constitute an important trade secret of the forwarding element manufacturer.

To keep the device-specific instructions secret, the translation from the standardized instructions outputted by the control element to the specialized instructions of the forwarding element could be performed at the forwarding element itself. However, such a configuration may have certain drawbacks. For example, the translation would require processing capabilities and processing time that would introduce undesirable complexity into the forwarding element design and may also detract from the ability of the forwarding element to forward packets at wire speed as it receives them.

Thus, the problem facing a forwarding element manufacturer is that it may be forced to either divulge its proprietary interface to a control element manufacturer, allowing the control element to output the proper instructions to the forwarding element, or keep the interface secret and be confronted with decreased effectiveness of the forwarding element hardware.

The forwarding element plugin is a clever and novel solution to this problem. As used throughout the written specification, the term “forwarding element plugin” is used to denote a module that can be provided by the manufacturer of the forwarding element, for example, for inclusion with the control element. The fact that the module is a “plugin” indicates that the module can be designed for inclusion with the control element without necessarily exposing its functionality to the manufacturer of the control element. Additionally, the fact that the module is a plugin means that it can effectively conceal the specialized data set of the forwarding element from the manufacturer of the control element. As a result, the control element can send instructions to properly configure the forwarding element without forcing the forwarding element manufacturer to divulge its trade secrets and without introducing complexity or latency of packet forwarding in the forwarding element. For additional discussion, please see the background portion of the written specification and pp. 6-13.

The Ramaswamy reference is cited as teaching the forwarding element plugin. In particular, the master module 54 is cited as the equivalent of the claimed forwarding element plugin. Yet, Ramaswamy fails to capture the inventive significance of the claimed forwarding element plugin. For example, the master module 54 is not a “plugin” as that term is used in the applicants’ written specification. As stated above, the term

“forwarding element plugin” is meant to describe a module that can be integrated into a control element to allow the control element to properly configure the forwarding element without divulging features of the forwarding element instruction interface to the control element or its manufacturer. The master module 54 does not conceal the forwarding element’s configuration interface from the control element and therefore does not teach the claimed forwarding element plugin.

The applicants submit that Ramaswamy does not teach or suggest a forwarding element plugin integrated with the control element to conceal from the control element a configuration interface of the forwarding element. Cohen does not cure the deficiency of Ramaswamy. Therefore, the applicants submit that claim 1 is patentable over Cohen in view of Ramaswamy and ask that the claim be passed to allowance.

Claims 2, 3, 6, and 7 depend from and include the limitations of claim 1. Therefore, claims 2, 3, 6, and 7 are patentable over the references for at least the reasons set forth with respect to claim 1.

Claims 4 and 5 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Cohen in view of Ramaswamy and Beighe et al. (U.S. Patent 5,742,607). However, claims 4 and 5 depend from claim 1 and are patentable over the cited references for at least the reasons set forth with respect to claim 1.

Claims 8-16 and 17-21 were rejected under the same rationale as claims 1-7. The applicants therefore submit that the rejections of claims 8-16 and 17-21 have been overcome for reasons similar to those set forth with respect to claims 1-7.

New Claims

The applicants submit that new claims 22 and 23 depend from claim 1 and are patentable over the cited references for at least the reasons set forth with respect to claim

1. The applicants further submit that claims 22 and 23 are independently patentable for the following reasons.

As to claim 22, the references, taken alone or in combination, do not teach or suggest that the forwarding element is remotely located from the control element.

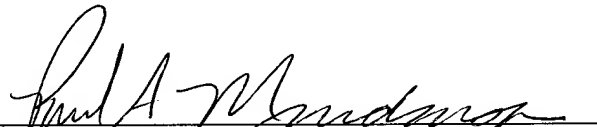
As to claim 23, the references, taken alone or in combination, do not teach or suggest that the device-specific instruction set of the forwarding element is indicative of the design or hardware implementation of the forwarding element.

CONCLUSION

For at least the foregoing reasons, the applicant submits that the rejections have been overcome. Therefore, claims 1-23 are in condition for allowance and such action is earnestly solicited. The examiner is respectfully requested to contact the undersigned by telephone if such contact would further the examination of the present application. Please charge any shortages and credit any overcharges to our Deposit Account number 02-2666.

Respectfully submitted,
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